CLAIMS

1. A device for culturing cells and tissue, the device being of the type comprising at least one culture well (18-i) arranged to define a chamber (19-i) suitable for receiving cells or tissue to be cultured, first and second reservoirs (2 and 25) each housing at least one flexible bag (6, 7; 27, 29), at least one of the bags of the reservoirs being suitable for receiving a culture fluid, link means (20, 21) coupled to said well and to said bags to enable the culture fluid to flow from one reservoir to the other via said well, pressurization means (60-92) arranged to apply to the bags of the first and second reservoirs (2 and 25) respective first and/or second sequences of external pressures defined by at least one control module (50) for causing the culture fluid to flow through said well, the device being characterized in that it includes temperature regulation means (35, 47, 49, 51-58) controlled by said control module and arranged to maintain a first selected temperature or a first selected temperature cycle inside said well (18-i) and/or to subject the culture fluid leaving at least one of said first and second reservoirs (2 and 25) in order to feed said well to a second selected temperature or to a second selected temperature cycle.

2. A device according to claim 1, characterized in that said temperature regulation means comprise a fluid circuit including a first portion (47) integrated in the walls defining said well (18-i) and arranged to enable a heat-conveying fluid to circulate therethrough.

3. A device according to claim 2, characterized in that the first portion of the fluid circuit includes first connection means (46) opening out into circulation

channels (47) for the heat-conveying fluid that are integrated in the walls of the well (18-i).

4. A device according to any one of claims 1 to 3, characterized in that said temperature regulation means comprise a fluid circuit including second and third portions (35) respectively integrated in the walls (15) defining the first and second reservoirs (2 and 25) and arranged to allow a heat-conveying fluid to circulate therethrough.

5. A device according to claim 4, characterized in that each of the first and second reservoirs (2 and 25) is made by assembling together an inner shell (16) and an outer shell (17) housing the inner shell and defining an inter-shell space (35) in which the heat-conveying fluid can circulate.

6. A device according to claim 2 or claim 3 combined with claim 4 or claim 5, characterized in that the second portion (35) of the fluid circuit is arranged to feed heat-conveying fluid to the first portion (47), and the third portion of said fluid circuit (35) is arranged to collect the heat-conveying fluid that has circulated through the first portion (47).

7. A device according to claims 3, 5, and 6 in combination, characterized in that the second and third portions (35) of the fluid circuit include second and third connection means (43, 45) opening out into the inter-shell space (35) and suitable for being connected for a first sub-portion to the first connection means (46) and for a second sub-portion to a fourth portion (53, 55) of the fluid circuit for feeding and collecting heat-conveying fluid.

8. A device according to any one of claims 2 to 7, characterized in that said fluid circuit includes a pump coupled to a main container (49) containing a fraction of the heat-conveying fluid and electric heater means (51) for heating said heat-conveying fluid in controlled manner before it is fed to the first, second, and third portions (47, 43, and 45).

9. A device according to any one of claims 1 to 8, characterized in that said temperature regulation means comprise first and second electric heater elements for providing at least some of the controlled heating of the well.

10. A device according to any one of claims 1 to 9, characterized in that said temperature regulation means include second electric heater elements for providing at least a portion of the controlled heating of the first and second reservoirs.

11. A device according to claim 9 or claim 10, characterized in that said electric heater elements comprise heater resistances secured to walls defining the reservoirs and/or the well.

12. A device according to any one of claims 1 to 11, characterized in that each of the first and second reservoirs (2 and 25) comprises a top portion (3, 26) and a bottom portion (4, 28) interconnected via a narrow intermediate portion (5, 23), each top and bottom portion of the first and second reservoirs housing a respective flexible bag, said top and bottom flexible bags (6, 27; 7, 29) communicating with each other via the intermediate portions (5, 23), and said link means (20, 21) communicating with the bottom bags (6, 29), and the top and bottom portions (3, 26; 4, 28) of the first and second reservoirs (2 and 25) each further including a

leaktight inlet (38, 40), and in that the pressurization means comprise a fluid pump (60) suitable for feeding high pressure pressurization fluid via a first portion of the pressurization circuit (64) to a second portion of the pressurization circuit (77, 82, 83, 89) that is connected to top and bottom valves (78, 81, 84, 87; 79, 80, 85, 86) controlled by the control module (50) and suitable for feeding each top and bottom portions (3, 26; 4, 28) of the first and second reservoirs via said leaktight inlets (38, 40) with pressurization fluid at a pressure that is high, low, or intermediate.

13. A device according to claims 8 and 12 in combination, characterized in that the first portion of the pressurization circuit (64, 65) includes a sub-portion (73) immersed in the heat-conveying fluid contained in the main container (49) in such a manner as to feed the second portion of the pressurization circuit (77, 82, 83, 89) with heated pressurization fluid.

14. A device according to claim 13, characterized in that said pressurization means include an auxiliary container (74) placed in said main container (49) in contact with the heat-conveying fluid, the container containing a humidifying fluid and being fed with pressurization fluid by the sub-portion (74) of the first portion of the pressurization circuit so that the pressurization fluid which feeds the second portion of the pressurization circuit (65) presents a selected degree of humidity.

15. A device according to any one of claims 1 to 14, characterized in that it includes at least two wells (18-i) placed in series and communicating with each other via said link means (21), one of the wells (18-1) being connected to said first reservoir (2) and the other well (18-3) being connected to said second reservoir (25).

16. A device according to claim 15, characterized in that it includes a third well (18-2) placed in series between the other two wells and communicating with each of them via said link means (23).

17. A device according to any one of claims 1 to 16, characterized in that the control module (50) includes a memory (98) of the re-writable type suitable for storing said pressure sequences and said first and second selected temperatures, or the first and second selected temperature cycles.

18. A device according to any one of claims 1 to 17, characterized in that said control module (50) is arranged to control the inlet sections of each reservoir and of the chamber when they are fed by a common heat-conveying circuit, so as to control their respective temperatures independently.

19. A device according to any one of claims 1 to 18, characterized in that it includes at least one nutrient container (14) and gas or fluid feed devices (32) connected to thermostat circuits, and in that said control module (50) is arranged to control said thermostat circuits in such a manner as to maintain the respective contents of the nutrient container (14) and/or of the gas feed devices (32) at selected temperatures.

20. A device according to any one of claims 1 to 19, characterized in that each reservoir portion is connected to a heating fluid circuit so that the portions of the reservoirs that are placed on either side of the chamber can be placed at different temperatures so as to create temperature cycles or profiles in said wells.

21. A device according to any one of claims 1 to 20, characterized in that said temperature regulation means

are arranged to impart a temperature shock to the inside of the chamber and/or the wells.

22. A device according to any one of claims 1 to 21, characterized in that the temperature regulation means include at least one temperature sensor suitable for supplying the control module with measurements representative of the temperature inside a well.

23. A device according to any one of claims 1 to 22, characterized in that it includes a cover for isolating at least the wells from the outside.

24. A device according to claim 23, characterized in that the cover is for isolating both the wells and the reservoirs from the outside.

25. An installation for culturing cells and tissue, characterized in that it comprises at least two devices (1-i) according to any one of claims 1 to 24 placed in parallel, together with a main control unit (50) for controlling said devices together.

26. An installation according to claim 25, characterized in that it includes a main fluid circuit feeding the wells and/or reservoirs of each device in parallel.

27. An installation according to claim 25, characterized in that it includes central temperature regulation means controlled by said main control unit (50) and arranged to maintain the same selected first temperature or the same ~~selected first temperature cycle inside the wells of each~~ device and/or for subjecting the culture fluid that leaves at least one of said first and second reservoirs of each device for feeding its wells to the same selected second temperature or to a same selected second temperature cycle.

28. An installation according to claim 27, characterized in that said main control unit (50) controls the temperature regulation means of each device so that they maintain independently of one another a first selected temperature or a first selected temperature cycle within the wells of the device and/or so that they act independently of one another to subject the culture fluid that leaves at least one of said first and second reservoirs of the device for feeding its wells to a second selected temperature or to a second selected temperature cycle.

29. An installation according to any one of claims 25 to 28, characterized in that it includes a main cover for isolating at least the wells of each device simultaneously from the outside.

30. An installation according to claim 29, characterized in that said main cover serves to isolate the wells and the reservoirs of each device simultaneously from the outside.